

PB87-191920

Pesticide Fact Sheet Number 120: Methiocarb

(U.S.) Environmental Protection Agency
Washington, DC

31 Mar 87

U.S. Department of Commerce
National Technical Information Service

NTIS



Pesticide Fact Sheet

PB87-191920

Name of Chemical: Methiocarb

Reason for Issuance: Registration Standard

Date Issued: March, 1987

Fact Sheet Number: 120

1. Description of Chemical

Chemical Name: 4-methylthio-3,5-xylylmethylcarbamate

Common Name : methiocarb

Trade Names : mercaptodimethur, metmercaptopuron,
mesurol, methiocarbe, Bay 37344, and H-321

OPP (Shaughnessy) Number: 100501

Chemical Abstracts Service (CAS) Number: 2032-65-7

Year of Initial Registration: 1972

Pesticide Type: Insecticide, acaricide; molluscicide;
and bird and rodent repellent

Chemical Family: Carbamate

U.S. Producer: Mobay Chemical Corporation

2. Use Patterns and Formulations

Application Sites: Corn and sunflower fields, fruit,
orchards, blueberries, ginseng,
avocadoes, peppers, ornamentals,
greenhouses, lawns and turf

Types of Formulation: Dust, granular, wettable powder and
pelleted/tableted.

Types/Methods of Application: Soil-incorporated, foliar,
aerial and broadcast.

REPORT DOCUMENTATION PAGE	1. REPORT NO.	2.	3. Recipient's Accession No.
4. Title and Subtitle EPA Pesticide Fact Sheets - methiocarb		5. Report Date Issued 3/31/87	
		6.	
7. Author(s) EPA, Office of Pesticide Programs, Registration Division		8. Performing Organization Rept. No. 540/FS-87-180	
9. Performing Organization Name and Address US Environmental Protection Agency Office of Pesticide Programs Registration Division, TS-767C 401 M Street, S.W. Washington, D.C. 20460		10. Project/Task/Work Unit No.	
		11. Contract(C) or Grant(G) No. (C) (G)	
12. Sponsoring Organization Name and Address Same as #9		13. Type of Report & Period Covered	
		14.	
15. Supplementary Notes			
16. Abstract (Limit: 200 words) This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred. 1. Issuance or reissuance of a registration standard, 2. Issuance of each special review document, 3. Registration of a significantly changed use pattern, 4. Registration of a new chemical, or 5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.			
17. Document Analysis a. Descriptors Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, Science Findings b. Identifiers/Open-Ended Terms c. COSATI Field/Group			
18. Availability Statement Publicly Available		19. Security Class (This Report) Unclassified	21. No. of Pages 6
		20. Security Class (This Page) Unclassified	22. Price

3. Science Findings

Summary Science Statement

Technical methiocarb is highly acutely toxic by the oral route and of relatively low acute toxicity by the dermal route. Methiocarb's primary mechanism of toxicity is cholinesterase inhibition. Methiocarb sulfoxide, a cholinesterase-inhibiting metabolite of methiocarb was shown to be more acutely toxic than methiocarb in an acute rat toxicity test (7 mg/kg in female rats and 9 mg/kg in male rats). Results of cholinesterase studies suggest that methiocarb sulfoxide may be more toxic than methiocarb. A 30-day dog feeding study conducted with methiocarb sulfoxide is required to assess the cholinesterase inhibition of this metabolite. Available studies are not sufficient to complete the assessment of methiocarb and its metabolites. Data gaps exist for acute inhalation; 21-days dermal; mouse oncogenicity; reproduction; mutagenicity; and general metabolism studies. Methiocarb is very highly acutely toxic to avian species, to both coldwater and warmwater fish, and to freshwater invertebrates on an acute basis. It is slightly toxic to practically non toxic to avian species on a subacute dietary basis. Field testing, an avian repellency study and an aquatic residue monitoring study are required for completion of the Agency's assessment of the potential risk to avian and aquatic species.

Chemical Characteristics:

Physical State: Crystalline solid

Color: White

Odor: Slight mercaptan-like

Boiling Point: Not distillable

Melting Point: 121°C

Bulk Density: 35-40 lb/cu ft.

ph: N/A (not soluble enough)

Toxicology Characteristics:

Acute oral toxicity (rat)	14-30 mg/kg; Toxicity Category I
Acute dermal toxicity (rabbits)	> 2000 mg/kg; Toxicity Category III

Acute delayed neurotoxicity (hen)	Negative at 380 mg/kg
Chronic feeding (rat)	NOEL for cholinesterase inhibition = 67 ppm (3.35 mg/kg/day)
Chronic feeding (dog)	NOEL for cholinesterase inhibition = 5 ppm (0.125 mg/kg/day)
Oncogenicity (rat)	not oncogenic up to 600 ppm
Teratology (rat)	negative up to 10 mg/kg/day
Teratology (rabbit)	negative up to 10 mg/kg/day

Physiological and Biochemical Characteristics:

Metabolism and persistence in plants and animals:

Radiolabeled studies on the uptake, translocation and metabolism of methiocarb in plants show that methiocarb undergoes two routes of metabolic breakdown in plants. Methiocarb may be oxidized to the sulfoxide (MSO) and thereafter hydrolyzed to methiocarb sulfoxide phenol (MSOP). These metabolites may be further oxidized and hydrolyzed to yield methiocarb sulfone (MSO₂) or methiocarb sulfone phenol (MSO₂P). A secondary metabolic route is the hydrolysis of methiocarb to the phenol (MP). The metabolism of methiocarb in animals is not well understood. Available information again suggests two pathways of metabolism. The major route in both chickens and ruminants appears to be hydrolysis to methiocarb phenol (MP) followed by oxidation to methiocarb sulfoxide phenol (MSOP). Additional metabolism studies in ruminants and poultry are required.

Mechanism of pesticidal action: cholinesterase-inhibition

Environmental Characteristics:

Adequate data are not available to assess the environmental fate of methiocarb; data are not adequate to assess methiocarb's potential for contaminating groundwater.

Ecological Characteristics:

Avian acute oral toxicity:	mallard duck	12.8 mg/kg
Subacute dietary toxicity:	mallard duck; 1071 ppm and ring-necked pheasant; greater than 5000 ppm.	

Avian reproductive effects: mallard duck; negative at 100 ppm and bobwhite quail; negative at 50 ppm.

96-hour fish toxicity: rainbow trout; 0.436 ppm and bluegill sunfish; 0.734 ppm

48-hour fresh water invertebrate toxicity: Daphnia magna; .019 mg/kg

Tolerance Reassessment

Tolerances have been established for residue of methiocarb and its cholinesterase-inhibiting metabolites in or on blueberries (5.0 ppm), cherries (5.0 ppm), citrus fruits (0.02 ppm), corn (0.03 ppm), and peaches (15.0 ppm). The tolerances for blueberries and cherries are interim tolerances, due to expire on March 31, 1989. Refer to 40 CFR 180.320.

The food additive tolerances listed for methiocarb under 21 CFR 193.145 and 21 CFR 561.175 were temporary tolerances established to cover residues in or on grape food and feed items resulting from application of the pesticide to grapes under an experimental use permit. These tolerances and experimental use permit expired December 31, 1980.

Tolerances are expressed in terms of methiocarb and its cholinesterase - inhibiting metabolites.

Available data are not sufficient to conduct a full tolerance assessment. Data gaps exist for the residue analytical method; field residue studies and animal metabolism studies.

4. Required Unique Labeling and Regulatory Position Summary

Use classification - All outdoor commercial and agricultural uses have been classified restricted use under this Standard; all on the basis of avian toxicity; and all, with the exception of the corn seed treatment, on the basis of fish and aquatic species toxicity. This is an interim precautionary measure pending submittal and evaluation of the avian repellency and field studies, and the aquatic residue monitoring studies.

Endangered species labeling - Labeling for seed treatment to corn; bait application to corn; and golf course and sod farm uses will be required pending concurrence on proposed labeling by the Fish and Wildlife Service, U.S. Department of the Interior.

Reentry interval - A 24-hour reentry interval is imposed pending submittal and evaluation of reentry data. This reentry labeling restriction is being imposed for use of methiocarb on commercial turf; commercially grown ornamentals; agricultural crops (except seed treatment); and in greenhouses.

Tolerances - no additional permanent tolerances will be established pending the approval of a residue analytical method. Tolerances above 5.00 ppm cannot be toxicologically supported and the existing tolerance of 15.0 ppm in/on peaches will be revoked.

5. Summary of major data gaps:

<u>Toxicology - generic</u>	<u>Date Due</u>
Acute inhalation - rats	October 1987
21-day dermal	October 1987
30-day feeding (dog) methiocarb sulfoxide	October 1987 (acceptable protocol)
Mouse oncogenicity study	October 1990
Reproductive effects	December 1988
Mutagenicity testing	February 1988
General metabolism study	April 1989

Residue Chemistry

Livestock metabolism - (ruminants and poultry)	October 1988
Analytical methodology for plants and animals	July 1988
Data on levels of residues in: citrus fruits, cherries, blueberries, and corn	**
Tolerance proposals and/or residue data to support the following uses: avocados; pepper and sunflower seed crops; preplant application for agricultural crops, and non-bearing deciduous fruit trees.	**

** Submittal due dates for these data are contingent on the submittal and evaluation of the analytical methodology data.

Ecological Effects

Field testing for mammals and birds	October 1987 (acceptable protocol)
Avian repellency test	April 1988
Acute toxicity for estuarine and marine organisms	August 1987
Fish early life stage	November 1987
Aquatic invertebrate life cycle	November 1987
Aquatic residue monitoring	April 1988

Environmental Fate:

Hydrolysis	January 1988
Photodegradation - water and soil	May 1987
Soil metabolism - aerobic and anaerobic	July 1989
Leaching and adsorption/desorption	August 1987
Soil dissipation	November 1988
Confined rotational crop	November 1989
Fish accumulation	April 1988
Reentry studies	December 1987

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